Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Use of Spectrum Bands Above 24 GHz For Mobile Radio Services	)	GN Docket No. 14-177
	)	
Establishing a More Flexible Framework to Facilitate Satellite Operations in the 27.5-28.35 GHz and 37.5-40 GHz Bands	)	IB Docket No. 15-256
	)	
Amendment of Parts 1, 22, 24, 27, 80, 90, 95, and 101 To Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation and Policies for Certain Wireless Radio Services	)	WT Docket No. 10-112
	)	
Allocation and Designation of Spectrum for Fixed-Satellite Services in the 37.5-38.5 GHz, 40.5-41.5 GHz and 48.2-50.2 GHz Frequency Bands; Allocation of Spectrum to Upgrade Fixed and Mobile Allocations in the 40.5-42.5 GHz Frequency Band; Allocation of Spectrum in the 46.9-47.0 GHz Frequency Band for Wireless Services; and Allocation of Spectrum in the 37.0-38.0 GHz and 40.0-40.5 GHz for Government Operations	)	IB Docket No. 97-95

REPLY COMMENTS OF STARRY, INC.

Starry, Inc. (Starry)[1] submits these reply comments urging the Federal Communications Commission (FCC or Commission) to continue to promote competitive access to millimeter wave (mmW) spectrum. The initial record in response to the *Spectrum Frontiers Second Further*

[1] Starry, Inc., is a Boston- and New York-based technology company that is utilizing millimeter waves to re-imagine last-mile broadband access as an alternative to fixed wireline broadband. Starry is currently deploying its proprietary fixed 5G wireless technology in the Boston, Washington, DC, and Los Angeles areas, with plans to expand to our presence to additional U.S. cities in 2018.

Notice of Proposed Rulemaking (*Frontiers Second FNPRM*)[2] demonstrates strong support for enforcing the spectrum holdings limits in the 28, 37, and 39 GHz bands in the pre-auction application review process, for requiring equipment to operate across the two segments of the 24 GHz band (24.25-24.45 GHz and 24.75-25.25 GHz), and for seeking comment on the potential for making the 26 GHz band available for flexible use services. In addition, while outside of the scope of the *Frontiers Second FNPRM,* we also highlight the substantial existing record support for coordinated shared licensed access to the 37-37.6 GHz band, and we respectfully encourage the Commission to finalize the coordinated sharing structure in the near term.

The Commission recently reported that 44 percent of developed census blocks have *zero* broadband providers offering service of at least 100 megabits per second (Mbps) down and 10 Mbps up, and only 41 percent of developed census blocks have one provider offering service at that level.[3] Starry currently offers service at 200 Mbps, symmetrical – and that is a floor, not a ceiling.[4] We can offer such a robust service in part because of the high capacity of mmW spectrum. [5] Access to this mmW spectrum is critical. We recently announced a collaboration with Marvell in which we will offer the combined benefits of their 802.11ax technology with our innovative mmW transceiver front ends to create an ecosystem of capable providers.[6] This powerful ecosystem of providers can help improve the quality and quantity of broadband options across the country,[7] but only if the Commission protects competitive access to mmW spectrum.

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[2] *Use of Spectrum Bands Above 24 GHz, et al.*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10988 (2017) (*Frontiers Second R&O and Second FNPRM*).

[3] Internet Access Service: Status as of December 31, 2016, *Report*, at 6 fig. 4 (WCB, IATD Feb. 2018) (*Internet Access Service Report*).

[4] Starry, Inc., *FCC Progress Report II*, Call Sign WI2XEB, at 12 (filed Dec. 8, 2017) (Starry Second Progress Report) https://apps.fcc.gov/els/GetAtt.html?id=202100&x=.

[5] Our service is enabled by a combination of mmW spectrum and our technology stack, which leverages 802.11 radios to operate on 160 megahertz channels at 256 QAM at 5 gigabits per second (Gbps) per sector under the current 802.11ac standard, and over 10 Gbps per sector as we transition to 802.11ax. *See* Starry Second Progress Report at 5-9.

[6] *Starry Announces Groundbreaking Joint Initiative with Marvell to Speed the Deployment of Fixed Wireless 5G Technologies*, Press Release (Jan. 8, 2018), https://dyajmw2sca9cs.cloudfront.net/press/pdf/08%20January%2018%20-%20Starry%20Marvell%20Announcement%20Press%20Release-%20FINAL.pdf.

[7] We also note that the Commission's data suggests fixed wireless providers are more likely to compete with other fixed wireless providers than wireline providers are to compete with other wireline providers, by a wide margin: 4.2 percent of developed census blocks are served by three fixed wireless providers, versus 0 percent for fiber to the premises and 0.3 percent for cable modem. *Internet Access Service Report* at p. 43 fig. 41.

I. THE RECORD SUPPORTS OPERABILITY IN THE 24 GHz BAND AND EXPLORING OPENING THE 26 GHz BAND FOR WIRELESS BROADBAND

The record in response to the *Frontiers Second FNPRM* demonstrates broad support for rules requiring that equipment be capable of operating across both segments of the 24 GHz band and for seeking comment on making the 26 GHz band available for wireless broadband.

With respect to operability across the 24 GHz band, both service providers and equipment vendors support the Commission's operability proposal.[8] As the record demonstrates, the Commission can facilitate competitive access to advanced 5G technologies by requiring operability across both segments of the band.[9] The Commission should continue its effective policy of ensuring robust access to wireless equipment ecosystems and adopt its proposed operability rule for the 24 GHz band.

Commenters also strongly support the Commission seeking comment on making the 26 GHz band available for wireless broadband.[10] As Starry argued in its initial comments, the Commission can at a minimum seek comment on whether the band can be shared with incumbents, and if so, how best to protect those incumbents.[11] This will be a globally harmonized band, and the U.S. will benefit from making it available for wireless broadband, if possible (and even if heavily encumbered). The Commission should include the 26 GHz band in a subsequent *Third Further Notice of Proposed Rulemaking*.

II. PRE-AUCTION SPECTRUM HOLDING REVIEWS ARE ESSENTIAL TO PROMOTE COMPETITIVE ACCESS TO SPECTRUM AT AUCTION

The record reflects an expected split between competitive providers and large incumbents regarding the costs and benefits of spectrum holdings policies.[12] Predictably, parties

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[8] Comments of AT&T, GN Docket No. 14-177, *et al.* at 10-11 (filed Jan. 23, 2018); Comments of the Competitive Carriers Association, GN Docket No. 140177, *et al.* at 5-8 (filed Jan. 23, 2018) (CCA Comments); Comments of Nokia, GN Docket No. 14-177, *et al.* at 4 (filed Jan. 23, 2018); Comments of Starry, Inc., GN Docket No. 14-177 *et al.* at 5 (filed Jan. 23, 2018) (Starry Comments); Comments of T-Mobile, GN Docket No. 14-177, *et al.* at 10 (filed Jan. 23, 2018); Comments of the United States Cellular Corporation, GN Docket No. 14-177, *et al.* at 2-5 (filed Jan. 23, 2018).

[9] *See* AT&T Comments at 10; CCA Comments at 5-8; Starry Comments at 2-4; T-Mobile Comments at 10; USCC Comments at 2-5.

[10] Comments of CTIA – The Wireless Association, GN Docket No. 14-177, *et al.* at 8-10 (filed Jan. 23, 2018) (CTIA Comments); Nokia Comments at 6-7; T-Mobile Comments at 11-12. While CTIA advocates for exclusive licensing in the 26 GHz band, the Commission should rationally explore coordinated shared access as a solution to sharing the band with incumbent users.

[11] Starry Comments at 5-6.

[12] *See* CCA Comments at 5-8; Starry Comments at 2-4; USCC Comments at 6-10; AT&T Comments at 8-10; Verizon Comments at 4-8.

that currently hold substantial mmW spectrum portfolios – and may seek more – want to eliminate pre-auction spectrum holdings reviews for the 28, 37, and 39 GHz bands.[13]

The Commission clearly believes there are benefits to at least some level of review of spectrum holdings in secondary market transactions.[14] This is perhaps the most minimal step the Commission could take to meet the competition policy demand of the Telecommunications Act of 1996: the Commission must avoid excessive concentration of licenses.[15] While secondary market reviews are case-by-case and the parties to any transaction that exceeds the 1,850 megahertz threshold will fight aggressively for approval, the application of the holding limit in secondary market transactions demonstrates a recognition of some potential harm from over-consolidation of mmW spectrum licenses.

Arguments that spectrum holding limitations applied at the pre-auction stage inhibit investment and innovation are completely unfounded.[16] There is no evidence that the Commission is not making *enough* mmW spectrum available for future mobile 5G networks and services. Both Verizon and AT&T have announced significant plans to begin substantial capital investment in new 5G networks through 2018, which is necessarily based on the spectrum available to them today.[17] Even without an auction, Verizon already controls abut 54 percent of the MHz-pops in the 28 GHz band and over 40 percent of the MHz-pops in the 39 GHz band.[18] AT&T, even after returning some of the FiberTower licenses, holds over 20 percent of the MHz-Pops in the 39 GHz band.[19] Under the current aggregation limit, despite this significant concentration of spectrum holdings by two large incumbents, both have substantial headroom across all markets to acquire even more spectrum at a future auction.[20]

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[13] *See* AT&T Comments at 8-10; Verizon Comments at 4-8.

[14] *Use of Spectrum Bands Above 24 GHz, et al.*, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014, 8078-84 ¶¶ 178-190 (2016) (*Frontiers First R&O and FNPRM*); *Frontiers Second R&O and Second FNPRM*, 32 FCC Rcd at 11011 ¶ 74.

[15] *See* 47 U.S.C. § 309(j)(3).

[16] *See* Verizon Comments at 5.

[17] *See AT&T Drives Path to Nationwide Mobile 5G with Multi-gigabit Speeds*, Press Release (Feb. 21, 2018), http://about.att.com/story/multigigabit_mobile_5g.html; Corinne Reichert, *Verizon 5G to Launch in Sacramento in 2018*, ZDNet (Nov. 29, 2017), https://www.wirelessweek.com/news/2017/02/verizon-announces-5g-customer-trials-11-cities-5g-forum-partners.

[18] *See* Starry, Inc. *Ex Parte*, GN Docket No. 14-177, *et al.* (filed Nov. 6, 2017) (Starry Spectrum Holdings *Ex Parte*).

[19] *Id.*

[20] Verizon is below the 1,850 megahertz threshold in all markets, with a maximum of 1,650 megahertz in any market. *Application of Verizon Communications Inc., and Straight Path Communications, Inc., For Consent to Transfer Control of Local Multipoint Distribution Service, 39 GHz, Common Carrier Point-to-Point Microwave, and 3650-3700 MHz Service Licenses*, Memorandum

The Broadcast Incentive Auction is an instructive example of the positive investment impact of the reasonable application of pre-auction spectrum holdings limits. Verizon sat out the auction to focus on densifying its network using its existing spectrum holdings, and AT&T has already entered into a transaction to sell the licenses it won to instead focus on FirstNet.[21] T-Mobile, on the other hand, won a significant portfolio of licenses and is aggressively deploying its new network incorporating this new spectrum band.[22]

Maintaining a reasonable spectrum holdings limit that is applied prior to the auction in the 28 GHz, 37 GHz, and 39 GHz band does not impact large providers' ability to invest billions in new networks and technologies. Instead, by ensuring competitive access to spectrum through an auction, the Commission is merely adding to this investment by allowing other providers to participate and gain access to mmW spectrum to drive 5G further into the country.

III. THE COMMISSION SHOULD FINALIZE THE RULES FOR COORDINATED LICENSED SHARED ACCESS TO THE 37-37.6 GHz BAND

The record developed since the *First Frontiers R&O* demonstrates significant support for the existing rules for licensed shared access for the 37-37.6 GHz band, and we urge the Commission to finalize the sharing rules in the near term.[23] As the Commission recognizes, this is an important opportunity to enhance shared access methodologies between commercial providers, and commercial and federal providers.[24] It also represents an additional path to new

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Opinion and Order, at p. 9 ¶ 22 (WTB rel. Jan. 18. 2018); AT&T is below the 1,850 megahertz threshold in all markets, with a maximum of 796.8 megahertz in any county. *Application of AT&T Mobility Spectrum LLC and FiberTower Corporation, For Consent to Transfer Control of 39 GHz Licenses*, Memorandum Opinion and Order, at p. 8 ¶ 20 (WTB rel. Feb. 8, 2018). In addition, the Commission has established a precedent where the limit scales upward when additional bands are made available.

[21] *See* Nicola Palmer, Chief Network Officer, Verizon Wireless, *Unparalleled Network Leadership by Doing*, Blog Post (Apr. 28, 2017), http://www.verizon.com/about/news/unparalleled-network-leadership-doing; Colin Gibbs, *AT&T Looks to Sell Remaining 600 MHz Spectrum to LB License Co*, FierceWireless (Jan. 6, 2018), https://www.fiercewireless.com/wireless/at-t-looks-to-sell-600-mhz-spectrum-to-lb-license-co-for-nearly-1b.

[22] T-Mobile won 1,525 licenses across 414 Partial Economic Areas. *See Incentive Auction Closing and Channel Reassignment Public Notice*, Public Notice, 32 FCC Rcd 2786, Appx. B (rel. Apr. 13, 2017). In January, T-Mobile announced that it had "lit up" its 600 MHz spectrum in 586 cities and towns. *T-Mobile #1 in Customer Satisfaction Throughout 0217,* Press Release (Jan. 3, 2018), https://newsroom.t-mobile.com/news-and-blogs/number-1-customer-satisfaction-2017.htm.

[23] *See* Dynamic Spectrum Alliance, *Letter*, GN Docket No. 14-177, *et al.* (filed Nov. 9, 2017); Marvell Semiconductor, Inc. *Letter*, GN Docket No. 14-177, *et al.* (filed Nov. 6, 2017); Comments of the Consumer Technology Association, GN Docket No. 14-177 *et al.* at 2 (filed Jan. 23, 2018); NCTA-The Internet & Television Association *Comments*, GN Docket No. 14-177, *et al.* (filed Sept. 30, 2016); Open Technology Institute, Consumers Union, and Public Knowledge *Ex Parte*, GN Docket No. 14-177, *et al.* (filed Nov. 7, 2017); Starry, Inc., *Letter*, GN Docket No. 14-177, *et al.* (filed June 1, 2017); Starry, Inc., *Letter*, GN Docket No. 14-177, *et al.* (filed Nov. 9, 2017); .

[24] *Frontiers First R&O and FNPRM*, 31 FCC Rcd at 8060 ¶ 113.

investment and innovation in mmW 5G technologies and services that comes at no cost to the ability of large incumbent providers to deploy their own technologies and services.

After the *Second Frontiers Report and Order*, this small spectrum band represents only about 4 percent of the spectrum the Commission has made available for terrestrial licensed and unlicensed uses, and satellite use in the mmW bands.[25] This is not a binary choice between shared licensed spectrum and exclusively licensed spectrum – there is enough mmW capacity to support a multiplicity of providers, use cases, and spectrum access schemes simultaneously. This is especially important in the context of 5G; access to shared spectrum can enhance the possibility of new technologies and services evolving to capitalize on mmW bands, helping the U.S. lead the world. We strongly urge the Commission to reject the pending petitions for reconsideration and finalize the rules for coordinated shared access in the 37-37.6 GHz band.

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[25] *See* Starry Spectrum Holdings *Ex Parte*.